

AMENDMENT TO THE CLAIMS

Note that all the claims currently pending in this application, including those not presently being amended, have been reproduced below for the Examiner's convenience.

1-68. (Cancelled)

69. (Previously Added) An optical system comprising:

a first optical component for forming an intermediate image of an object;

a second optical component for forming a final image with light from the

intermediate image; and

an aperture stop,

wherein at least one of said first optical component and said second optical component comprises an off-axial curved surface, and wherein said first optical component is

configured such that a spot size near the intermediate image is two or more times a size of a noise source near the intermediate image when an aperture of said aperture stop is minimized.

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70. (Previously Added) An optical system according to Claim 69, wherein

the size of the noise source is greater than or equal to $5b/|\beta_{11}|$, where b is a minimum resolution on the final image plane and β_{11} is an image magnification of said second optical component.

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71. (Previously Added) An optical system according to Claim 69, wherein the following condition is satisfied:

$$V/|\beta_{11}| < U$$

where V is a spot size on the final image plane, β_{11} is an image magnification of said second optical component, and U is a spot size on the intermediate image position.

72. (Previously Added) An image pickup apparatus comprising:

an optical system according to Claim 69; and

an image pickup device,

wherein the final image is formed on a light receiving surface of said image pickup device by said optical system.

73. (Previously Added) An optical system comprising:

a first optical component for forming an intermediate image of an object;

a second optical component for forming a final image with light from the intermediate image; and

an aperture stop,

wherein at least one of said first optical component and said second optical component comprises an off-axial curved surface, and wherein said first optical component is configured such that a spot size near the intermediate image is three or more times a size of a noise source near the intermediate image when an aperture of said aperture stop is maximized.

74. (Previously Added) An optical system according to Claim 73, wherein the size of the noise source is greater than or equal to $5b/|\beta_{11}|$, where b is a minimum resolution on the final image plane and β_{11} is an image magnification of said second optical component.

75. (Previously Added) An optical system according to Claim 73, wherein the following relation is satisfied:

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$$V/|\beta_{11}| < U$$

where V is a spot size on the final image plane, β_{11} is an image magnification of said second optical component, and U is a spot size on the intermediate image position.

76. (Previously Added) An image pickup apparatus comprising:
an optical system according to Claim 73; and
an image pickup device,
wherein the final image is formed on a light receiving surface of said image pickup device by said optical system.

77. (Previously Added) An optical system comprising:
an optical element having a first optical component for forming an intermediate image of an object and a second optical component for forming again an object image with light from the intermediate image; and
an aperture stop,

wherein at least one of said first optical component and said second optical component comprises an off-axial curved surface, and wherein said first optical component is configured such that a size of a spot near the intermediate image is two or more times a size of a noise source near the intermediate image when an aperture of said aperture stop is minimized.

78. (Previously Added) An optical system according to Claim 77, wherein said optical element is a transparent body having two refractive surfaces and a plurality of reflective surfaces, and

wherein said two refractive surfaces and said plurality of reflective surfaces of said optical element are grouped into said first optical component and said second optical component in accordance with positions thereof with respect to the position of the intermediate image.

79. (Previously Added) An image pickup apparatus comprising:
an optical system according to Claim 77; and
an image pickup device,
wherein the final image is formed on a light receiving surface of said image pickup device by said optical system.

80. (Previously Added) An optical system comprising:
an optical element having a first optical component for forming an intermediate image of an object and a second optical component for forming again an object image with light from the intermediate image; and

an aperture stop,

wherein at least one of said first optical component and said second optical component comprises an off-axial curved surface, and wherein said first optical component is configured such that a size of a spot near the intermediate image is three or more times a size of a noise source near the intermediate image when an aperture of said aperture stop is maximized.

81. (Previously Added) An optical system according to Claim 80, wherein said optical element is a transparent body having two refractive surfaces and a plurality of reflective surfaces, and

wherein said two refractive surfaces and said plurality of reflective surfaces are grouped into said first optical component and said second optical component in accordance with positions thereof with respect to the position of the intermediate image.

82. (Previously Added) An image pickup apparatus comprising:

an optical system according to Claim 80; and

an image pickup device,

wherein the final image is formed on a light receiving surface of said image pickup device by said optical system.

83. (Previously Added) An optical system comprising:

a first optical component for forming an intermediate image of an object;

a second optical component for forming a final image with light from the intermediate image; and

an aperture stop,

wherein at least one of said first optical component and said second optical component comprises an off-axial curved surface, and wherein the following relation is satisfied:

$$\left| \frac{D \cdot f1}{S \cdot AR1} \right| < 0.1$$

where D is a size of a noise source near the intermediate image, f1 is a maximum focal length of said first optical component out of those dependent upon azimuths, an azimuth at the maximum focal length of said first optical component being defined as ξ , S is an on-axis astigmatic difference at the intermediate image position, and AR1 is a diameter of an exit pupil by said first optical component in correspondence to the azimuth ξ , at the time an aperture of said aperture stop is maximized.

84. (Previously Added) An image pickup apparatus comprising:

an optical system according to Claim 83; and

an image pickup device,

wherein the final image is formed on a light receiving surface of said image pickup device by said optical system.

85. (Previously Added) An optical system comprising:

a first optical component for forming an intermediate image of an object;

a second optical component for forming a final image with light from the intermediate image; and

an aperture stop,

wherein at least one of said first optical component and said second optical component comprises an off-axial curved surface, and wherein the following relation is satisfied:

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$$\left| \frac{D \cdot f1}{S \cdot AR2} \right| < 0.3$$

where D is a size of a noise source near the intermediate image, f1 is a maximum focal length of said first optical component out of those dependent upon azimuths, an azimuth at the maximum focal length of said first optical component being defined as ξ , S is an on-axis astigmatic difference at the intermediate image position, and AR2 is a diameter of an exit pupil by said first optical component in correspondence to the azimuth ξ , at the time an aperture of said aperture stop is minimized.

86. (Previously Added) An image pickup apparatus comprising:

an optical system according to Claim 85; and

an image pickup device,

wherein the final image is formed on a light receiving surface of said image pickup device by said optical system.

87. (Previously Added) An optical system comprising:
a first optical component for forming an intermediate image of an object;
a second optical component for forming a final image with light from the intermediate image; and
an aperture stop,
wherein at least one of said first optical component and said second optical component comprises an off-axial curved surface, and wherein the following relation is satisfied:

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$$\left| \frac{5b \cdot f1}{|\beta| \cdot S \cdot AR1} \right| < 0.1$$

where b is a minimum resolution on the final image plane, f1 is a maximum focal length of said first optical component out of those dependent upon azimuths, an azimuth at the maximum focal length of said first optical component being defined as ξ , S is an on-axis astigmatic difference at the intermediate image position, β is an image magnification of said second optical component, in a direction normal to the azimuth ξ , and AR1 is a diameter of an exit pupil by said first optical component in correspondence to the azimuth ξ at the time an aperture of said aperture stop is maximized.

88. (Previously Added) An image pickup apparatus comprising:
an optical system according to Claim 87; and
an image pickup device,
wherein the final image is formed on a light receiving surface of said image pickup device by said optical system.

89. (Previously Added) An optical system comprising:
a first optical component for forming an intermediate image of an object;
a second optical component for forming a final image with light from the
intermediate image; and
an aperture stop,
wherein at least one of said first optical component and said second optical
component comprises an off-axial curved surface, and wherein the following relation is satisfied:

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$$\left| \frac{5b \cdot f1}{|\beta| \cdot S \cdot AR2} \right| < 0.3$$

where b is a minimum resolution on the final image plane, f1 is a maximum
focal length of said first optical component out of those dependent upon azimuths, an azimuth at
the maximum focal length of said first optical component being defined as ξ , S is an on-axis
astigmatic difference at the intermediate image position, β is an image magnification of said
second optical component, in a direction normal to the azimuth ξ , and AR2 is a diameter of an
exit pupil by said first optical component in correspondence to the azimuth ξ at the time an
aperture of said aperture stop is minimized.

90. (Previously Added) An image pickup apparatus comprising:
an optical system according to Claim 89; and
an image pickup device,
wherein the final image is formed on a light receiving surface of said image
pickup device by said optical system.